GES IN BOTH QALITY AND COMPOSITION OF MEAT IN CASTRATED AND NONCASTRATED HOGGETS CLENBUTEROL

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MARY

The effect of clenbuterol (1 mg/kg diet) on both quantitative and qualitative carcass acteristics in castrated and noncastrated male hoggets fed diets contained 4.1 MJ energy 130 g protein/kg feed, respectively.

Clenbuterol intake induces a growht of preslaughter weight, slaughter carcass and nsions (weight and surface) of m.Longissimus dorsi in both castrated and Unoncastrated ets.

A protein increase was established in the meat and m.Longissimus dorsi, regardeless physiological condition. Mioglobin decrease as well as some changes in pH, colour, water ding capacity, show that clenbuterol makes worse the quality of meat produced. t 2 times in mean meat samples) is not accompanied with changes in their fatty-acid Drastic reducing of fats in animals treated (about 5 times in m.Longissimus dorsi and position.

RODUCTION

In our previous investigations on growing lambs, clenbuterol used in both the same s and duration of treatment, was established to show different effect depending on energy ue of diet (SHINDARSKA et al.,1991).At high concentrated feeding, an increase of meat, spectively of protein and decrease of fats in the carcass was observed,this being in formity with investigation of other authors (DICEMAN et al.,1987, BOHOROV et al.,1987, ney et al.,1987).Contrarivise ,at low concentrated feeding, clenbuterol has negative ect, showing that its influence on metabolism of animals depends on both feeding type and s (WILLIAMS,1987).

pleted It is intersting to investigate to what extent β-agonists show effect on animals of fect of growth.In this connection, the present study has been conducted, studying the aracteristics of clenbuterol (used in a low dose and for for a long time) on both quantitative of carcass in both castrated and noncastrated hoggets.

TERIAL AND METODS

Two experiments have been conducted on both male noncastrated and castrated hoggets, months old and live weight 46 and 43 kg, respectively at starting of trial. Animals of ch experiment were divided in control and two experimental groups. For the whole perimental period - during 6 months - animals of both experiments in all groups received same diet containing 4.1MJ of energy and 130 g of crude protein per kg diet. To the diet animals of experimental groups in both experiments, every day 1 mg of clenbuterol per kg diet has been additioned.

ntrol Animals were fed in groups, ad libitun and free access to water. Feed quantity of control group was determined through intake of both experimental groups. During the periment, live weight was controlled every month and feed intake - every day.

up of At the end of experimental period, 4 animals of both control and first experimental each trial have been slaughtered. In view of eliminating residual matter, animals me. second experimental group were slaughtered a week later, receiving no clenbuterol in that . After boning and grinding the left halt of the carcass, mean samples of ground meat as of m.Longissimus dorsi (LD) have been taken. In meat and muscle samples, fat and protein tents were determined, using the routine methods (SOXHLET, KJELDAHL). Methods for termining meat quality are described in previous publications (PINKAS et al., 1984).Total ids of m.Longissimus dorsi and mean meat samples have been extracted. Their fatty acid mposition was determined through gas - chromatography. For statistical evaluation of sults obtained, t-criterion of STUDENT was used.

SULTS AND DISCUSSION

rst Results presented in table 1 show that noncastrated hoggets of control group for the cond experiment are of a slight intensiver growth compared to castrated control of the rds (DIKEMAN et al., 1985). Analogical result has been also established in trails on cattle, pigs and strated and noncastrated animals in carcass characteristics (weight of slaughter carcass, at, as well as in both the weight, lenght and area of m. Longissimus dorsi).

imals Both protein and fat contents of carcass, and m.Longissimus dorsi in castrated is equal to that of noncastrated (table 2. In castrated calves was established nversely, higher fat content in m.Longissimus dorsi (PINKAS et al., 1987; MARINOVA et al., 992). Result obtained in hoggets is most likely conditioned - in certain extent - by the ter age of castration (8 months) on the one part, and on the other hand by extensive eding type energy - 4,1 MJ and protein 130 g/kg diet.

Higher pH and lower WBC values have been established in noncastrated animals (t
2). That provides a possibility for DFD-meat appearing at close values in myoglobin con
between both classes of animals.

Physiological condition changed of animals has exerted no significant effect
fatty-acid composition of lipids in both meat and m.Longissimus dorsi samples studied (t
3).

Clenbuterol treatment has exerted no effect on average daily gain, final live we
in animals of both experiments, respectively (table 1). Similar results haave been
obtined in growing lambs (BOHOROV et aal., 1987; SHINDARSKA et al., 1991) and in ca
(SHIAVETTA et al., 1990).

Results, presented in table 1, show that meat content in experimental animals o
second experiment is higher than that of control ones, accompanied by increasing the
weight and m.Longissimus dorsi area. In noncastrated animals (I experiment) clenbuterol
leads to analogical changes in m.Longissimus dorsi.

Data about chemical composition of meat and m.Longissimus dorsi (table 2) sho
positive effect of clenbuterol on protein content (by increase of 10-12 %) in
experiments. Higher deposition rate of protein in experimental lambs fed hight-concentra
diets (SHINDARSKA et al., 1991; BOHOROV et al., 1987) is conditioned by intense growth
that age.

Clenbuterol participation in diet for experimental animals in both experiments
led to reducing the fat content in meat (by 40 %) and to drastic decrease in m.Longissi
dorsi (5 times), not corresponding to increasing rate of protein. Lower retention rate
fats in this study, compared to our data for growing lambs (SHINDARSKA et al., 1991),
likely conditioned by the age of animals (compared growth and susceptibility to deposition
more fats) resulting in a major effect.

Clenbuterol activity on pH and WBS (table 2) is influenced by the sex of animals,
effect being opposed - in noncastrated it decreases indication for DFD meat, and in castra
it induces its appearence. Results obtained by us about both composition and quality of me
of m.Longissimus dorsi in castrated animals are one-way to those in another our study
lambs under high-energy feeding and treated with clenbuterol (MARINOVA et al., 199
BEERMANN et al(1985), ALLEN et al.(1985a) also report higher pH of the muscle (by 0,3 uni
in sheep treated with cimaterol and appeapance of DFD meat.

Results of fatty acid composition (table 3) of lipids in both meat and m.Longissi
dorsi for castrated and noncastrated animals show no significanf diferences.Drastic reduc
of fats in m.Longissimus dorsi of experimental animals is not accompanied by changes in fa
acid profile. Clenbuterol treatment leads to increasing the unsaturation (as a result
changing the relative contents of 18 : 1 and 18 : 0) of triacylglucerols in meat sampl
for noncastrated animals. Increased total unsaturation of samples studied rather reflec
observed changes in subcutaneous adipose tissue of that category of animals (BANSKALIEVA
al., 1992).

Both quality aand composition of body lipids are also known to determinate a gre
extent - both meat value and quality. The use of ß-agonists leads to producing leaner me
of good fatty acid composition. On the other hand, however both WBC, pH and mioglobin volu
suppose worsened qualitative.

One week pause before slaughtering animals received no clenbuterol supp
elimination of residual matter of that compound (HOVELL et al., 1988). Results presnted
tables 1, 2, 3 show that clenbuterol effect on traits studied does not fade away, in contra
to the same traits obtained in younger animals (SHINDARSKA et al., 1992).

CONCLUSION

Regardless of increasing both the weight and m.Longissimus dorsi area, clenbuter
exerts no effect on total meat quality in carcass of castrated and noncastrated hoggets.
Leaner meat produced, however, is of worsend qualitative characteristics.

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le 1
wth weight, gain and carcass analysis

Traits	Noncastrated			Castrated		
	Control	Exp.1	Exp.2	Control	Exp.1	Exp.2
Growth weight and gain						
ive weight, kg						
nitial body weight	46.46 ± 2.30 a	45.50 ± 3.50	45.50 ± 3.50	43.27 ± 3.04 b	42.73 ± 3.85	42.73 ± 3.85
inal body weight	63.27 ± 5.31 a	63.10 ± 7.30	63.10 ± 7.30	56.54 ± 4.03 b	58.18 ± 5.51	58.18 ± 5.51
verage daily gain , g	109 ± 26	114 ± 25	114 ± 25	86 ± 16	100 ± 11	100 ± 11
Carcass analysis						
ive weight before laughtering, kg	61.25 ± 3.59	61.50 ± 2.89	62.30 ± 1.04	54.75 ± 3.78	56.00 ± 0.82	56.67 ± 2.16
ody body weight, kg	25.75 ± 3.21	25.25 ± 2.30	25.57 ± 2.60	24.57 ± 3.20 1	24.98 ± 1.65 2	24.90 ± 3.57 1
eat, kg	18.15 ± 1.80	18.50 ± 1.20 1	20.30 ± 1.70 2	16.85 ± 1.30	19.25 ± 1.30	17.80 ± 1.10
ones, kg	5.50 ± 0.24	5.50 ± 0.24	6.60 ± 0.26	5.20 ± 0.39	4.50 ± 0.27	4.86 ± 0.29
Measurement m.Long.dorsi						
eight m.Long.dorsi, g	538 ± 94 1	698 ± 95 2	790 ± 92 2	568 ± 66 1	705 ± 49 2	673 ± 168 2
ength m.Long.dorsi, sm	39.0 ± 2.2 1	39.1 ± 3.2 1	39.5 ± 1.9 2	35.9 ± 2.6 1	35.1 ± 1.8 2	34.3 ± 2.8 2
rea m.Long.dorsi, sm²	21.6 ± 3.0	26.0 ± 3.5	30.7 ± 3.5	25.2 ± 2.0	29.2 ± 1.9	30.2 ± 3.8

the smallest possible diference between the superscripts (D) is : D = 1, P<0,05; D = 2, P<0,01; D = 3,P<0,001
nificant differences (P<0,05) between control groups are indicated with different letters (a,b).

Table 2

Chemical composition and quality characteristics of meat and m.Longissimus dorsi

Traits	Noncastrated			Castrated		
	Control	Exp.1	Exp.2	Control	Exp.1	Exp.2
Meat, %						
water	68.86 ± 3.89	72.13 ± 1.36	68.53 ± 1.93	66.50 ± 4.41	70.56 ± 2.98	71.93 ± 1.48
protein	17.61 ± 0.73	20.34 ± 0.74	20.52 ± 1.32	18.46 ± 0.88	20.27 ± 0.33	19.79 ± 0.59
fats	13.20 ± 3.76	7.15 ± 1.37	10.11 ± 1.00	14.45 ± 1.94	8.99 ± 1.33	4.04 ± 1.61
mineral matter	0.82 ± 0.12	0.86 ± 0.08	1.10 ± 0.10	0.92 ± 0.07	0.74 ± 0.12	0.99 ± 0.12
m.Long.dorsi						
water, %	75.30 ± 1.95	75.92 ± 0.57	75.41 ± 0.37	74.76 ± 1.23	76.26 ± 0.45	76.26 ± 1.17
protein, %	19.41 ± 0.08	23.05 ± 0.50	23.44 ± 0.76	20.89 ± 1.22	22.97 ± 0.58	23.07 ± 0.79
fats, %	5.17 ± 2.11	0.94 ± 0.08	1.27 ± 0.61	4.20 ± 0.55	0.82 ± 0.23	0.80 ± 0.71
mineral matter,%	1.00 ± 0.17	1.06 ± 0.04	1.23 ± 0.06	1.00 ± 0.02	0.99 ± 0.14	1.08 ± 0.03
pH, 24h	6.24 ± 0.16	6.11 ± 0.18	5.80 ± 0.03	5.75 ± 0.17	6.13 ± 0.16	6.03 ± 0.06
colour,525 nm	16.23 ± 0.76	15.78 ± 0.77	17.18 ± 1.60	15.27 ± 0.93	15.27 ± 0.23	15.92 ± 1.20
WBC, %	30.64 ± 1.34	32.64 ± 1.87	32.37 ± 2.18	37.25 ± 1.22	31.25 ± 2.44	31.70 ± 4.85
myoglobin,mg/g	4.51 ± 0.36	2.39 ± 0.15	2.54 ± 0.59	4.88 ± 0.65	2.64 ± 0.47	2.80 ± 0.44

If the smallest possible diference between the superscripts (D) is : D = 1, P<0,05; D = 2, P<0,01; D = 3, P<0,001
Singnificant differences (P<0,05) between control groups are indicated with different letters (a,b).

Table 3

Fatty acid composition (M%) of triacyiglycerols from meat and m.Longissimus dorsi of hoggets

Fatty acids	Noncastrated			Castrated		
	Control	Exp.1	Exp.2	Control	Exp.1	Exp.2
Meat						
16:0	25.6 ± 1.1	26.5 ± 1.7	25.5 ± 1.3	29.0 ± 0.3	25.1 ± 1.1	26.5 ± 0.0
16:1	3.3 ± 01	3.2 ± 0.2	3.7 ± 0.4	3.2 ± 0.2	3.2 ± 0.5	2.8 ± 0.5
18:0	24.7 ± 0.1	21.3 ± 0.8	21.2 ± 2.2	21.7 ± 0.5	25.0 ± 0.9	24.8 ± 0.7
18:1	41.5 ± 0.7	47.7 ± 1.1	42.7 ± 1.3	42.7 ± 0.4	41.6 ± 0.9	41.8 ± 1.1
18:2	5.0 ± 0.5	4.5 ± 0.4	6.7 ± 0.7	3.3 ± 0.5	5.0 ± 0.7	4.1 ± 0.5
m.Long.dorsi						
16:0	27.3 ± 1.4	25.2 ± 1.2	26.3 ± 0.7	28.2 ± 0.4	26.2 ± 1.6	25.4 ± 0.1
16:1	2.9 ±0.2	5.1 ± 0.8	3.8 ± 0.6	3.1 ± 0.2	3.1 ± 0.3	3.2 ± 0.1
18:0	20.0 ± 1.6	19.9 ± 0.4	18.5 ± 0.9	19.5 ± 0.7	20.9 ± 0.5	22.4 ± 1.1
18:1	43.9 ± 0.8	44.1 ± 0.9	43.1 ± 1.2	44.2 ± 1.1	44.2 ± 0.6	43.5 ± 1.0
18:2	6.6 ± 0.6	5.8 ± 0.2	8.4 ± 1.0	5.0 ± 0.8	5.6 ± 0.6	5.6 ± 0.6

If the smallest possible difference between the superscripts (D) is :D=1, P>0,05; D=2, P>0,01; D=3, P>0,001
Significant differences (P>0,05) between control groups are indicated with different letters (a,b)